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# Spring Config Properties

Eko Kurniawan Khannedy

# Eko Kurniawan Khannedy

- Technical architect at one of the biggest ecommerce company in Indonesia
- 10+ years experiences
- [www.programmerzamannow.com](http://www.programmerzamannow.com)
- [youtube.com/c/ProgrammerZamanNow](https://youtube.com/c/ProgrammerZamanNow)



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# Eko Kurniawan Khannedy

- Telegram : [@khannedy](https://t.me/khannedy)
- Facebook : [fb.com/ProgrammerZamanNow](https://www.facebook.com/ProgrammerZamanNow)
- Instagram : [instagram.com/programmerzamannow](https://www.instagram.com/programmerzamannow)
- Youtube : [youtube.com/c/ProgrammerZamanNow](https://www.youtube.com/c/ProgrammerZamanNow)
- Telegram Channel : [t.me/ProgrammerZamanNow](https://t.me/ProgrammerZamanNow)
- Email : echo.khannedy@gmail.com

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# Sebelum Belajar

- Spring Dasar

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# Agenda

- Pengenalan Config Properties
- Resource
- Resource Loader
- Message Source
- Application Properties
- Configuration Properties
- Property Source
- Profile
- Dan lain-lain

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# Pengenalan Config Properties

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# Pengenalan Config Properties

- Saat kita membuat aplikasi, sudah dipastikan bahwa kita pasti akan menambahkan konfigurasi pada aplikasi
- Misal saja konfigurasi database misalnya
- Spring sendiri memiliki fitur yang sangat baik dalam mendukung pengaturan konfigurasi aplikasi
- Pada kelas ini, kita akan bahas bagaimana cara melakukan konfigurasi pada aplikasi Spring yang kita buat

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# Membuat Project

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# Membuat Project

<https://start.spring.io/>

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# Resource



# Resource

- Sebelum kita belajar tentang Config Properties di Spring, kita perlu belajar dulu tentang Resource di Spring
- Di Java terdapat fitur bernama Java IO (Input Output) sebagai management resource
- Spring membungkus resource dalam sebuah interface bernama Resource
- <https://docs.spring.io/spring-framework/docs/current/javadoc-api/org/springframework/core/io/Resource.html>
- Walaupun Resource adalah sebuah interface, untuk membuatnya kita tidak perlu mengimplementasikan secara manual, sudah banyak implementasi class Resource di Spring



# Resource Implementation

## ▼ Implementations of Resource in 21 results

- Value read 21 results
  - >  AbstractFileResolvingResource.java 1 result
  - >  AbstractResource.java 1 result
  - >  BeanDefinitionResource.java 1 result
  - >  ByteArrayResource.java 1 result
  - >  ClassPathResource.java 1 result
  - >  ClassRelativeResourceLoader.java 1 result
  - >  ContextResource.java 1 result
  - >  DefaultResourceLoader.java 1 result
  - >  DescriptiveResource.java 1 result
  - >  FileSystemResource.java 1 result
  - >  FileSystemResourceLoader.java 1 result
  - >  FileUrlResource.java 1 result
  - >  FilteredReactiveWebContextResource.java 1 result
  - >  InputStreamResource.java 1 result
  - >  OriginTrackedResource.java 2 results
  - >  PathResource.java 1 result
  - >  ResourceDecoder.class 1 result
  - >  UrlResource.java 1 result
  - >  VfsResource.java 1 result
  - >  WritableResource.java 1 result



## Kode : Resource

```
var resource = new ClassPathResource( path: "/application.properties");

Assertions.assertNotNull(resource);

System.out.println(resource.getPath());
System.out.println(resource.getFilename());
System.out.println(resource.getFile().getAbsolutePath());
```

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# Resource Loader



# Resource Loader

- Spring memiliki fitur yang bisa kita gunakan untuk mengambil data resource secara otomatis, tanpa kita harus membuat object resource nya, namanya ResourceLoader
- <https://docs.spring.io/spring-framework/docs/current/javadoc-api/org/springframework/core/io/ResourceLoader.html>
- ResourceLoader memiliki method bernama getResource(String) yang bisa kita gunakan untuk mengambil sebuah resource
- ResourceLoader akan mendeteksi jenis Resource yang butuh diambil dari data String nya

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## Resource Protocol

Prefix	Sample	Description
classpath:	classpath:/com/pzn/application.properties	Mengambil resource dari classpath (isi project)
file	file:///Users/khannedy/file.properties	Mengambil resource dari file system
https:	https://www.programmerzamannow/file.properties	Mengambil resource dari http



# Resource Loader Aware

- ResourceLoader adalah sebuah interface, sehingga untuk menggunakannya, kita perlu implementasi class nya
- ApplicationContext adalah turunan dari ResourceLoader, sehingga kita juga bisa menggunakan ApplicationContext untuk mendapatkan Resource
- Atau kita juga bisa menggunakan ResourceLoaderAware untuk mendapatkan ResourceLoader secara otomatis
- <https://docs.spring.io/spring-framework/docs/current/javadoc-api/org/springframework/context/ResourceLoaderAware.html>



# Kode : Resource Loader Aware

```
@SpringBootApplication
public static class TestApplication {

    @Component
    public static class SampleResource implements ResourceLoaderAware {

        @Setter
        private ResourceLoader resourceLoader;

        public String getProperties() throws IOException {
            Resource resource = resourceLoader.getResource( location: "classpath:/resource.txt");
            try (var inputStream : InputStream = resource.getInputStream()) {
                return new String(inputStream.readAllBytes());
            }
        }
    }
}
```

## Kode : Test Resource Loader

```
@SpringBootTest(classes = ResourceLoaderTest.TestApplication.class)
public class ResourceLoaderTest {

    @Autowired
    private TestApplication.SampleResource sampleResource;

    @Test
    void testResource() throws IOException {
        Assertions.assertEquals(expected: "EKO", sampleResource.getProperties().trim());
    }
}
```

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# Message Source

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# Properties

- Pada Kelas Java, kita sudah belajar tentang Properties dan juga cara melakukan Internationalization menggunakan Properties
- Di Spring, kita juga melakukan hal yang sama, dengan cara yang lebih baik, tidak perlu melakukannya secara manual



# Message Source

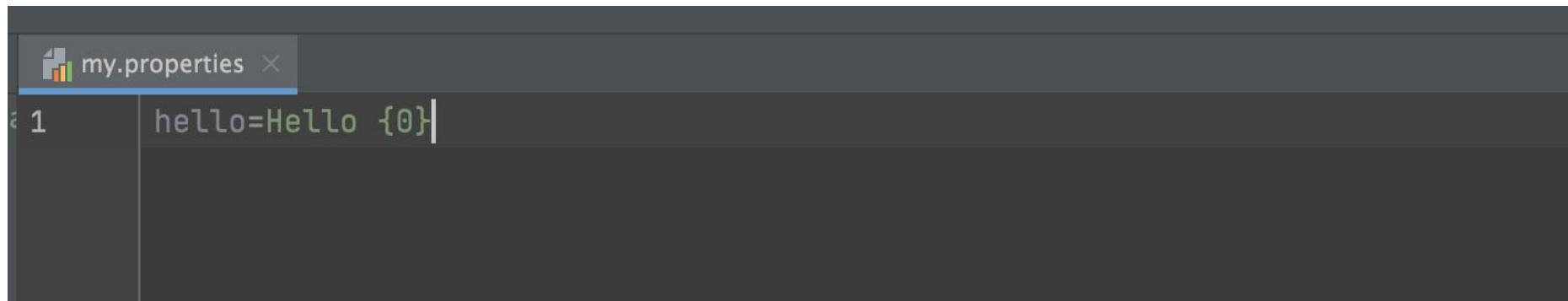
- Spring memiliki fitur yang bernama Message Source, yaitu fitur untuk mengambil message dari resource
- <https://docs.spring.io/spring-framework/docs/current/javadoc-api/org/springframework/context/MessageSource.html>
- MessageSource mengkombinasikan Properties dan MessageFormat, sehingga kita tidak perlu melakukannya secara manual seperti yang pernah kita praktekan di kelas Java Internationalization

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# Message Source Implementation

- MessageSource adalah sebuah interface, untuk menggunakannya, kita butuh implementasi class nya
- Kita tidak butuh membuatnya secara manual, kita bisa menggunakan class implementasi yang sudah disediakan oleh Spring, yaitu ResourceBundleMessageSource
- <https://docs.spring.io/spring-framework/docs/current/javadoc-api/org/springframework/context/support/ResourceBundleMessageSource.html>

# Kode : Properties



A screenshot of a code editor showing a properties file named "my.properties". The file contains one line of text: "hello=Hello {0}". The code editor has a dark theme with a light gray header bar. The file tab "my.properties" is highlighted with a blue bar. The line number "1" is visible on the left side of the editor.

```
my.properties X
1 hello=Hello {0}
```



# Kode : Message Source

```
@Configuration
public static class TestConfiguration {

    @Bean
    public MessageSource messageSource() {
        ResourceBundleMessageSource messageSource = new ResourceBundleMessageSource();
        messageSource.setBasename("my");
        return messageSource;
    }
}
```



## Kode : Test Message Source

```
@Test
void testMessageSource() {
    ApplicationContext context = new AnnotationConfigApplicationContext(TestConfiguration.class);
    MessageSource messageSource = context.getBean(MessageSource.class);

    String hello = messageSource.getMessage( code: "hello", new Object[]{ "Eko" }, Locale.getDefault());
    Assertions.assertEquals( expected: "Hello Eko", hello);
}
```

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# Spring Boot Message Source

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## Spring Boot Message Source

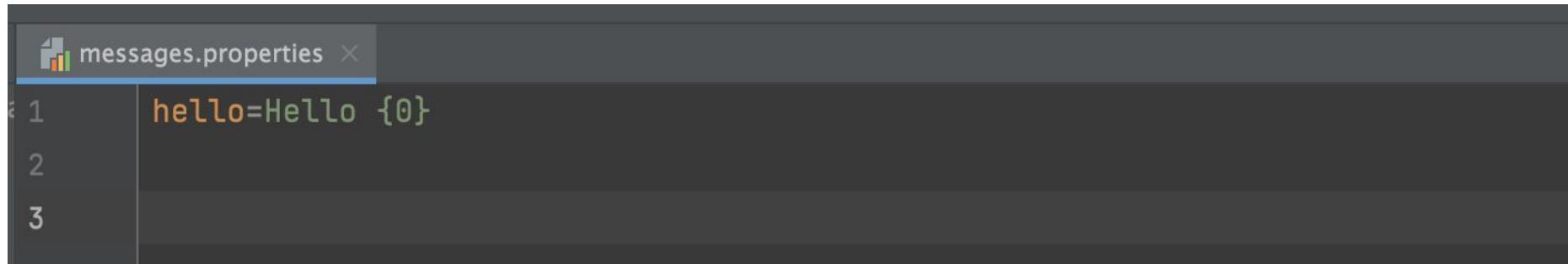
- Jika kita menggunakan Spring Boot, secara otomatis Spring Boot telah membuat Message Source secara otomatis, kita tidak perlu membuat bean untuk Message Source secara manual
- Selain itu secara default, Spring Boot akan membuat Message Source dengan mengambil data resource bundle di messages.properties

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# Message Source Aware

- Jika kita ingin menggunakan MessageSource, kita juga bisa menggunakan MessageSourceAware
- <https://docs.spring.io/spring-framework/docs/current/javadoc-api/org/springframework/context/MessageSourceAware.html>
- Atau sebenarnya, ApplicationContext adalah turunan dari MessageSource

## Kode : Properties



A screenshot of a code editor showing a properties file named "messages.properties". The file contains the following content:

```
hello=Hello {0}
```

The editor interface includes a toolbar at the top, a status bar at the bottom, and a dark-themed code area with line numbers on the left.



## Kode : Message Source Aware

```
@SpringBootApplication
public static class TestApplication {

    @Component
    public static class SampleSource implements MessageSourceAware {

        @Setter
        private MessageSource messageSource;

        public String helloEko() {
            return messageSource.getMessage("hello", new Object[]{"Eko"}, Locale.getDefault());
        }
    }
}
```

---

## Kode : Test Message Source

```
@SpringBootTest(classes = MessageSourceTest.TestApplication.class)
public class MessageSourceTest {

    @Autowired
    private TestApplication.SampleSource sampleSource;

    @Test
    void testMessageSource() {
        Assertions.assertEquals("Hello Eko", sampleSource.helloEko());
    }
}
```

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# Application Properties

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# Application Properties

- Saat kita membuat project Spring menggunakan start.spring.io, secara otomatis terdapat sebuah file application.properties
- File ini adalah pusat dari file properties untuk konfigurasi aplikasi Spring yang kita buat
- Secara otomatis, Spring Boot akan membaca konfigurasi yang kita masukkan ke dalam file application.properties
- Ini bukanlah file untuk Internationalization, melainkan file ini digunakan untuk konfigurasi aplikasi, jika kita butuh pesan untuk Internationalization, gunakan file messages.properties seperti yang sudah kita bahas sebelumnya

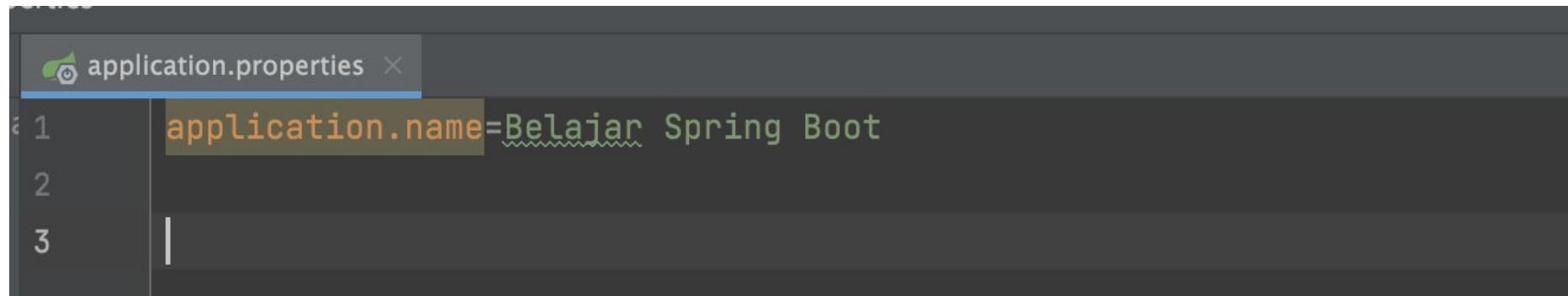
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## Mengakses Application Properties

- Ada banyak cara untuk mengakses konfigurasi yang terdapat di application.properties, nanti akan dibahas di chapter masing-masing

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## Kode : Application Properties



The screenshot shows a code editor window with a dark theme. The title bar of the window says "application.properties". The file contains the following content:

```
1 application.name=Belajar Spring Boot
2
3
```

The line "application.name=Belajar Spring Boot" is highlighted in orange, indicating it is the current line of interest.

## Kode : Mengakses Application Properties

```
@SpringBootTest(classes = ApplicationPropertiesTest.TestApplication.class)
public class ApplicationPropertiesTest {

    @Autowired
    private Environment environment;

    @Test
    void testApplicationProperties() {
        String message = environment.getProperty("application.name");
        Assertions.assertEquals(expected: "Belajar Spring Boot", message);
    }
}
```

---

# Environment

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# Environment

- Environment tidak hanya bisa digunakan untuk mengakses Application Properties
- Environment juga bisa digunakan untuk mengakses data environment variable pada sistem operasi
- <https://docs.spring.io/spring-framework/docs/current/javadoc-api/org/springframework/core/env/Environment.html>
- Kita bisa menggunakan EnvironmentAware jika ingin mendapatkan object Environment



# Kode : Environment

```
@Autowired  
private Environment environment;  
  
@Test  
void testEnvironment() {  
    String java_home = environment.getProperty("JAVA_HOME");  
    System.out.println(java_home);  
}
```

---

# Value



# Value

- Value merupakan Annotation yang bisa kita gunakan untuk melakukan inject data dari properties ke field yang kita tandai
- <https://docs.spring.io/spring-framework/docs/current/javadoc-api/org/springframework/beans/factory/annotation/Value.html>

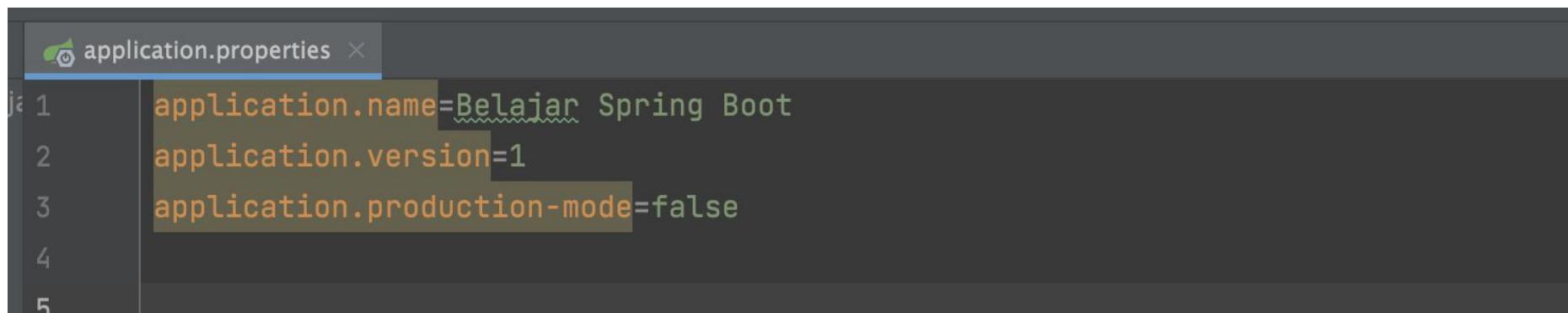
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## Value Application Properties

- Annotation Value bisa kita gunakan untuk mengambil data dari application properties
- Kita bisa menggunakan kode \${nama.properties.nya}
- Secara otomatis akan diambil valuenya, dan secara otomatis akan melakukan konversi juga

---

## Kode : Application Properties



The screenshot shows a code editor window with a dark theme. The title bar says "application.properties". The file contains the following configuration properties:

```
1 application.name=Belajar Spring Boot
2 application.version=1
3 application.production-mode=false
4
5
```



# Kode : Value Injection

```
@SpringBootApplication
public static class TestApplication {

    @Component
    @Getter
    public static class ApplicationProperties {

        @Value("${application.name}")
        private String name;

        @Value("${application.version}")
        private Integer version;

        @Value("${application.production-mode}")
        private boolean productionMode;
    }
}
```

# Kode : Unit Test Value Properties

```
@SpringBootTest(classes = ValuePropertiesTest.TestApplication.class)
public class ValuePropertiesTest {

    @Autowired
    private TestApplication.ApplicationProperties properties;

    @Test
    void testApplicationProperties() {
        Assertions.assertEquals(expected: "Belajar Spring Boot", properties.getName());
        Assertions.assertEquals(expected: 1, properties.getVersion());
        Assertions.assertFalse(properties.isProductionMode());
    }
}
```

---

## **Value System Variable**

- Selain application properties, Annotation Value juga bisa digunakan untuk mengambil data dari system properties atau environment variable
- Caranya sama seperti mengambil application properties
- Secara otomatis akan diambil valuenya, dan secara otomatis akan melakukan konversi juga



## Kode : Value System Variable

```
@SpringBootApplication
public static class TestApplication {

    @Component
    @Getter
    public static class SystemProperties {

        @Value("${JAVA_HOME}")
        private String javaHome;

    }
}
```



## Kode : Unit Test Value System Variable

```
@Autowired  
private TestApplication.SystemProperties systemProperties;  
  
@Test  
void testSystemProperties() {  
    Assertions.assertEquals(  
        expected: "/Users/khannedy/Tools/jdk-17.0.1.jdk/Contents/Home",  
        systemProperties.getJavaHome()  
    );  
}
```

---

# Property Source

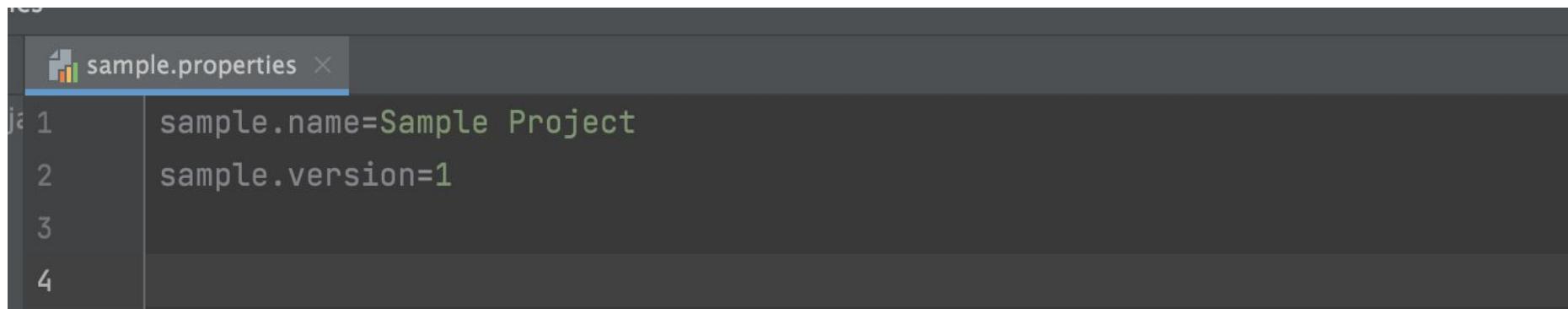


# Property Source

- Secara default, application properties hanya akan mengambil dari file di application.properties yang terdapat di classpath project
- Namun, Spring memiliki fitur yang bisa kita gunakan jika kita ingin menambahkan application properties dari file lain, namanya adalah PropertySource
- <https://docs.spring.io/spring-framework/docs/current/javadoc-api/org/springframework/context/annotation/PropertySource.html>
- Kita bisa sebutkan Resource mana yang kita tambahkan ke application properties
- Jika kita ingin menambah lebih dari satu property source, kita bisa gunakan annotation PropertySources

---

## Kode : Sample Properties



A screenshot of a code editor showing a properties file named "sample.properties". The file contains the following content:

```
sample.name=Sample Project
sample.version=1
```



# Kode : Property Source

```
@SpringBootApplication
@PropertySources({
    @PropertySource("classpath:/sample.properties")
})
public static class TestApplication {

    @Component
    @Getter
    public static class SampleProperties {

        @Value("${sample.name}")
        private String name;

        @Value("${sample.version}")
        private Integer version;
    }
}
```



## Kode : Test Property Source

```
@SpringBootTest(classes = PropertySourceTest.TestApplication.class)
public class PropertySourceTest {

    @Autowired
    private TestApplication.SampleProperties sampleProperties;

    @Test
    void testPropertySource() {
        Assertions.assertEquals("Sample Project", sampleProperties.getName());
        Assertions.assertEquals(1, sampleProperties.getVersion());
    }
}
```

---

# Test Property Source

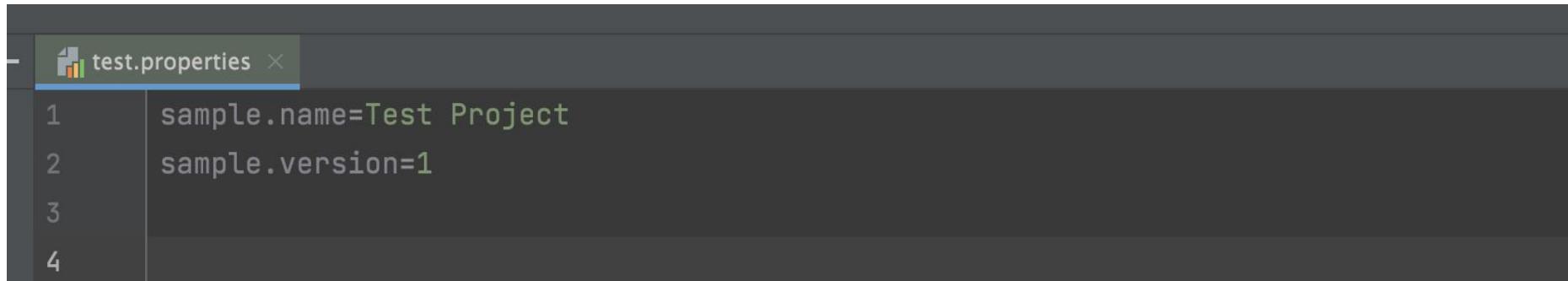
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# Test Property Source

- Saat membuat unit test, kadang-kadang kita ingin menggunakan properties file yang berbeda untuk mencoba skenario yang berbeda
- Hal ini agak sulit jika dilakukan dengan menggunakan Annotation PropertySource
- Untungnya di Spring sudah disediakan Annotation TestPropertySource untuk kebutuhan ini, jadi kita bisa menggunakan properties file yang kita mau di unit test
- <https://docs.spring.io/spring-framework/docs/current/javadoc-api/org/springframework/test/context/TestPropertySource.html>
- Jika membutuhkan properties file lebih dari satu, kita bisa gunakan annotation TestPropertySources

---

## Kode : Test Properties



A screenshot of a code editor showing a properties file named "test.properties". The file contains the following content:

```
1 sample.name=Test Project
2 sample.version=1
3
4
```



# Kode : Test Application

```
@SpringBootApplication
public static class TestApplication {

    @Component
    @Getter
    public static class SampleProperties {

        @Value("${sample.name}")
        private String name;

        @Value("${sample.version}")
        private Integer version;
    }
}
```



# Kode : Test Property Source

```
@TestPropertySources({  
    @TestPropertySource("classpath:/test.properties")  
})  
@SpringBootTest(classes = PropertySourceTest.TestApplication.class)  
public class PropertySourceTest {  
  
    @Autowired  
    private TestApplication.SampleProperties sampleProperties;  
  
    @Test  
    void testPropertySource() {  
        Assertions.assertEquals(expected: "Test Project", sampleProperties.getName());  
        Assertions.assertEquals(expected: 1, sampleProperties.getVersion());  
    }  
}
```

---

# Profile

---

# Profile

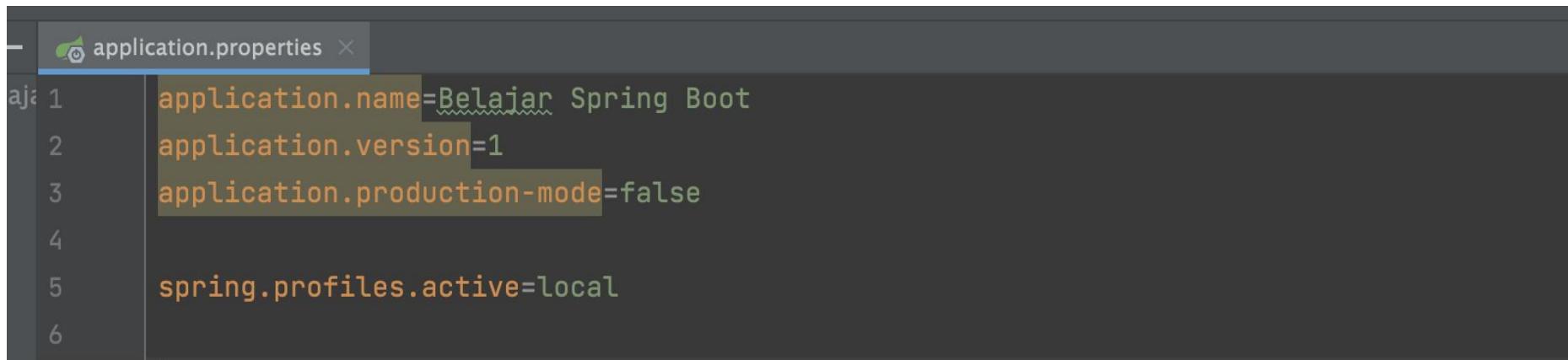
- Profile merupakan fitur di Spring yang bisa kita gunakan untuk menentukan component jalan di profile mana
- Profile cocok sekali ketika kita butuh component berbeda pada kondisi tertentu, misal kita buat component untuk koneksi ke Memory Database, tapi jika di Local misal, kita ingin component nya diganti dengan koneksi di memory aplikasi saja
- Untuk menandai sebuah component dengan informasi Profile, kita bisa menggunakan Annotation Profile
- <https://docs.spring.io/spring-framework/docs/current/javadoc-api/org/springframework/context/annotation/Profile.html>

---

## Profile Properties

- Untuk menentukan profile apa yang berjalan, kita bisa menentukannya di application properties dengan menggunakan key `spring.profiles.active`
- Dimana kita bisa menentukan active profile lebih dari satu jika mau

## Kode : Application Properties



The screenshot shows a code editor window with the file 'application.properties' open. The file contains the following configuration properties:

```
1 application.name=Belajar Spring Boot
2 application.version=1
3 application.production-mode=false
4
5 spring.profiles.active=local
6
```



# Kode : Test Component

```
@Component
@Profile({"local"})
public static class SayHelloLocal implements SayHello {

    @Override
    public String say(String name) {
        return "Hello " + name + " from Local";
    }
}

@Component
@Profile({"production"})
public static class SayHelloProduction implements SayHello {

    @Override
    public String say(String name) {
        return "Hello " + name + " from Production";
    }
}
```



# Kode : Unit Test Profile

```
@SpringBootTest(classes = ProfileTest.TestApplication.class)
public class ProfileTest {

    @Autowired
    private TestApplication.SayHello sayHello;

    @Test
    void testProfile() {
        Assertions.assertEquals("Hello Eko from Local", sayHello.say(name: "Eko"));
    }
}
```

---

# Active Profile

- Kadang jika harus mengubah profile di application properties akan menyulitkan ketika kita membuat unit test untuk beberapa profile
- Untuk mengubah profile di unit test, kita bisa menggunakan annotation ActiveProfiles
- <https://docs.spring.io/spring-framework/docs/current/javadoc-api/org/springframework/test/context/ActiveProfiles.html>



# Kode : Active Profiles

```
@SpringBootTest(classes = ProfileTest.TestApplication.class)
@ActiveProfiles({"production"})
public class ProfileTest {

    @Autowired
    private TestApplication.SayHello sayHello;

    @Test
    void testProfile() {
        Assertions.assertEquals("Hello Eko from Production", sayHello.say(name: "Eko"));
    }
}
```

---

# Profile di Environment

- Kadang kita ingin mendapatkan profile pada saat aplikasi berjalan
- Jika ada kasus seperti ini, kita bisa menggunakan Environment
- Terdapat method `getActiveProfiles()` untuk mendapatkan profile yang sedang aktif
- <https://docs.spring.io/spring-framework/docs/current/javadoc-api/org/springframework/core/env/Environment.html#getActiveProfiles-->



## Kode : Profile di Environment

```
@SpringBootApplication
public static class TestApplication {

    @Component
    public static class SampleProfile implements EnvironmentAware {

        @Setter
        private Environment environment;

        public String[] getActiveProfiles() {
            return environment.getActiveProfiles();
        }
    }
}
```



# Kode : Unit Test Profile di Environment

```
@SpringBootTest(classes = ProfileEnvironmentTest.TestApplication.class)
@ActiveProfiles({"production", "local"})
public class ProfileEnvironmentTest {

    @Autowired
    private TestApplication.SampleProfile sampleProfile;

    @Test
    void testProfileInEnvironment() {
        Assertions.assertArrayEquals(new String[]{"production", "local"}, sampleProfile.getActiveProfiles());
    }
}
```

---

# Profile Properties File

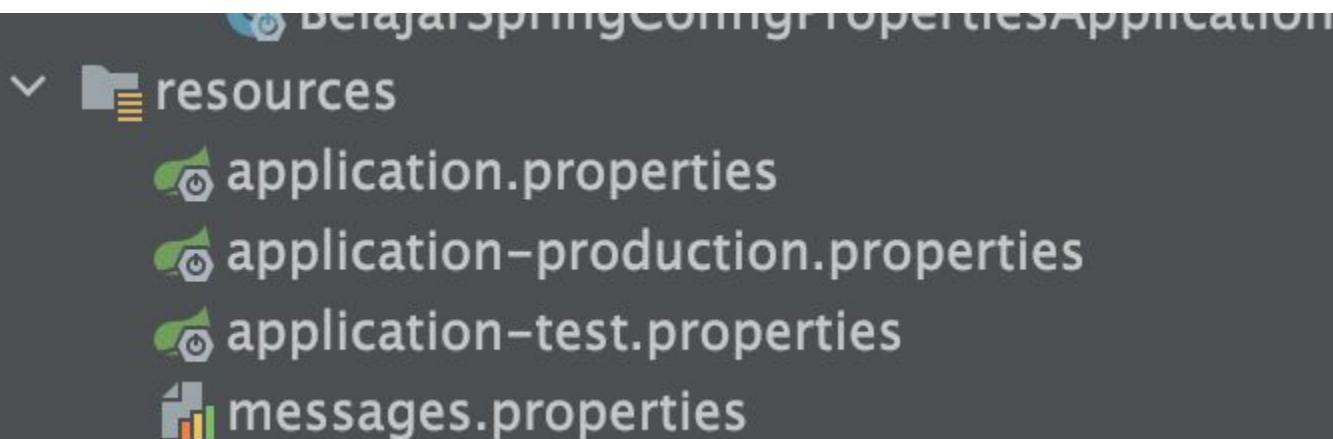
---

## Profile Properties File

- Saat kita menggunakan fitur profile, kita juga bisa membuat file properties sesuai dengan profile yang aktif
- Penamaan properties file adalah application-{profile}.properties
- Misal jika active profile adalah dev, maka application-dev.properties akan di load
- Jika active profile lebih dari satu, maka semua files properties tiap profile akan di load
- Jangan lupa application.properties akan tetap di load disemua profile

---

# Properties Files





# Kode : Test Application

```
@SpringBootApplication
public static class TestApplication {

    @Component
    @Getter
    public static class ProfileProperties {

        @Value("${profile.default}")
        private String defaultFile;

        @Value("${profile.production}")
        private String productionFile;

        @Value("${profile.test}")
        private String testFile;
    }
}
```



# Kode : Unit Test Properties Files

```
@SpringBootTest(classes = ProfileFileTest.TestApplication.class)
@ActiveProfiles({
    "production", "test"
})
public class ProfileFileTest {

    @Autowired
    private TestApplication.ProfileProperties profileProperties;

    @Test
    void testProfileFiles() {
        Assertions.assertEquals( expected: "Default", profileProperties.getDefaultFile());
        Assertions.assertEquals( expected: "Production", profileProperties.getProductionFile());
        Assertions.assertEquals( expected: "Test", profileProperties.getTestFile());
    }
}
```

---

# Configuration Properties



# Configuration Properties

- Spring Boot memiliki sebuah fitur canggih bernama Configuration Properties
- Fitur ini bisa digunakan melakukan binding secara otomatis key yang ada di application properties ke Java Bean property secara otomatis
- Namun untuk menggunakan fitur ini, kita perlu menambahkan dependency yang dibutuhkan, yaitu spring-boot-configuration-processor

```
<dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-configuration-processor</artifactId>
    <optional>true</optional>
</dependency>
```

---

## Configuration Properties Annotation

- Untuk menandai Java Bean agar secara otomatis di binding ke Application Properties, kita perlu menandai class nya dengan annotation ConfigurationProperties
- <https://docs.spring.io/spring-boot/docs/current/api/org/springframework/boot/context/properties/ConfigurationProperties.html>
- Selanjutnya kita perlu menentukan prefix untuk key di application properties nya



# Kode : Java Bean Properties

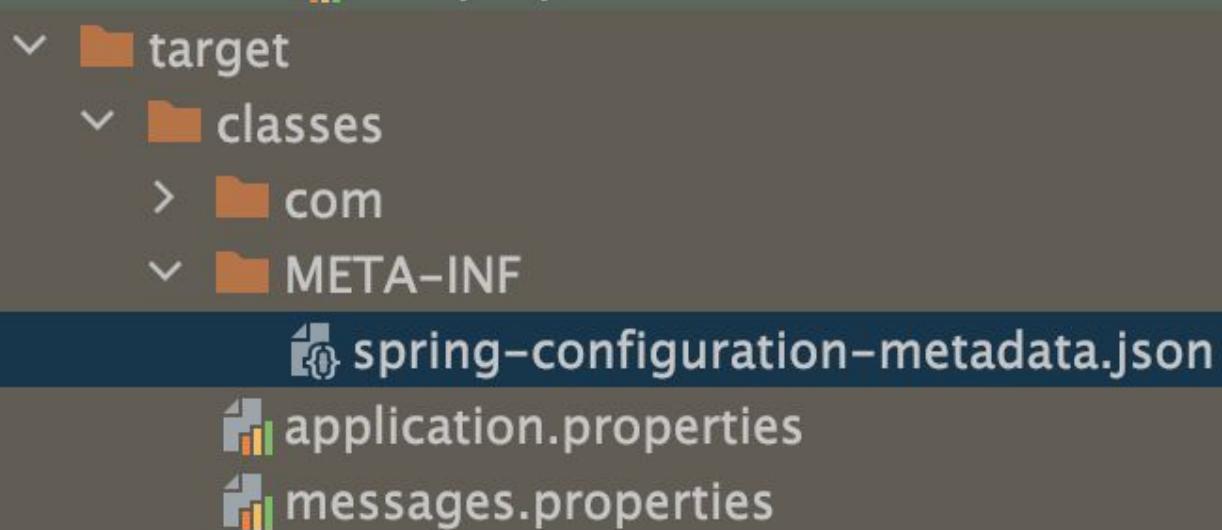
```
@Getter  
@Setter  
@ConfigurationProperties("application")  
public class ApplicationProperties {  
  
    private String name;  
  
    private Integer version;  
  
    private boolean productionMode;  
  
}
```

---

## Spring Configuration Metadata

- Sebenarnya, untuk membuat Spring melakukan automatic binding ke Configuration Properties, kita harus membuat sebuah file metadata
- Namun hal tersebut tidak perlu kita lakukan manual, secara otomatis ketika menambahkan dependency configuration properties, dependency tersebut akan melakukan auto generate file metadata dari class yang kita tandai menggunakan annotation ConfigurationProperties
- Cara untuk membuat file metadata secara auto generate cukup kita lakukan kompilasi saja project kita, misal jika menggunakan maven, tinggal gunakan perintah : mvn compile

## Hasil Metadata





# Detail Metadata

```
    },
    {
        "name": "application.name",
        "type": "java.lang.String",
        "sourceType": "com.programmerzamannow.spring.config.properties.ApplicationProperties"
    },
    {
        "name": "application.production-mode",
        "type": "java.lang.Boolean",
        "sourceType": "com.programmerzamannow.spring.config.properties.ApplicationProperties",
        "defaultValue": false
    },
    {
        "name": "application.version",
        "type": "java.lang.Integer",
        "sourceType": "com.programmerzamannow.spring.config.properties.ApplicationProperties"
    }
}
```



# Enable Configuration Properties

- Secara default, Configuration Properties tidak akan berjalan jika kita tidak beritahukan ke Spring Boot Application
- Kita perlu memberitahu bahwa kita membuat class Configuration Properties dengan menggunakan Annotation `EnableConfigurationProperties`
- <https://docs.spring.io/spring-boot/docs/current/api/org/springframework/boot/context/properties/EnableConfigurationProperties.html>



## Kode : Spring Boot Application

```
@SpringBootApplication
@EnableConfigurationProperties({
    ApplicationProperties.class
})
public static class TestApplication {

}
}
```



# Kode : Unit Test Configuration Properties

```
@SpringBootTest(classes = ConfigurationPropertiesTest.TestApplication.class)
public class ConfigurationPropertiesTest {

    @Autowired
    private ApplicationProperties applicationProperties;

    @Test
    void testConfigurationProperties() {
        Assertions.assertEquals(expected: "Belajar Spring Boot", applicationProperties.getName());
        Assertions.assertEquals(expected: 1, applicationProperties.getVersion());
        Assertions.assertFalse(applicationProperties.isProductionMode());
    }
}
```

---

# Complex Configuration Properties

---

## Complex Configuration Properties

- Configuration Properties juga mendukung Java Bean yang kompleks, misal yang berisikan Java Bean object lain
- Hal ini membuat pembuatan Configuration Properties menjadi lebih mudah, karena tidak perlu kita lakukan secara manual

# Kode : Embedded Class

```
@Setter
@ConfigurationProperties("application")
public class ApplicationProperties {

    private String name;

    private Integer version;

    private boolean productionMode;

    private DatabaseProperties database;

    @Getter
    @Setter
    public static class DatabaseProperties {

        private String username;
```



# Kode : Metadata

```
{  
    "name": "application.database.database",  
    "type": "java.lang.String",  
    "sourceType": "com.programmerzamannow.spring.config.properties.ApplicationProperties$DatabaseProperties"  
},  
{  
    "name": "application.database.password",  
    "type": "java.lang.String",  
    "sourceType": "com.programmerzamannow.spring.config.properties.ApplicationProperties$DatabaseProperties"  
},  
{  
    "name": "application.database.url",  
    "type": "java.lang.String",  
    "sourceType": "com.programmerzamannow.spring.config.properties.ApplicationProperties$DatabaseProperties"  
},  
{
```

---

## Kode : Unit Test Complex Configuration Properties

```
@Test
void testDatabaseProperties() {
    Assertions.assertEquals( expected: "eko", applicationProperties.getDatabase().getUsername());
    Assertions.assertEquals( expected: "nahasia", applicationProperties.getDatabase().getPassword());
    Assertions.assertEquals( expected: "jdbc:host:port", applicationProperties.getDatabase().getUrl());
    Assertions.assertEquals( expected: "belajar", applicationProperties.getDatabase());
}
```

---

# Collection Configuration Properties

---

## Collection Configuration Properties

- Configuration Properties juga mendukung binding properties untuk jenis collection seperti List atau Map
- Hal ini kadang bermanfaat ketika memang data yang kita butuhkan sangat kompleks, bisa Collection yang berisi data sederhana, atau bahkan collection yang berisi Java Bean lagi

---

## Kode : Collection Configuration Properties

```
private String password,  
  
private String url;  
  
private String database;  
  
private List<String> whitelistTables;  
  
private Map<String, Integer> maxTablesSize;  
  
}
```



## Kode : Sample Properties

```
application.database.username=eko
application.database.password=rahasia
application.database.url=jdbc:host:port
application.database.database=belajar
application.database.whitelist-tables=products,customers,categories
application.database.max-tables-size.products=100
application.database.max-tables-size.customers=100
application.database.max-tables-size.categories=100
```

---

## Kode : Sample Properties Dengan Index

```
application.database.url=jdbc:host:port
application.database.database=belajar
application.database.whitelist-tables[0]=products
application.database.whitelist-tables[1]=customers
application.database.whitelist-tables[2]=categories
application.database.max-tables-size.products=100
application.database.max-tables-size.customers=100
application.database.max-tables-size.categories=100
```



# Kode : Unit Test Collection Configuration Properties

```
@Test
void testCollectionProperties() {
    Assertions.assert_equals(Arrays.asList("products", "customers", "categories"),
                           applicationProperties.getDatabase().getWhitelistTables());
    Assertions.assert_equals(expected: 100,
                           applicationProperties.getDatabase().getMaxTablesSize().get("products"));
    Assertions.assert_equals(expected: 100,
                           applicationProperties.getDatabase().getMaxTablesSize().get("customers"));
    Assertions.assert_equals(expected: 100,
                           applicationProperties.getDatabase().getMaxTablesSize().get("categories"));
}
```



# Embedded Collection

- Configuration Properties juga mendukung jika kita membuat Java Bean di dalam collection



# Kode : Embedded Collection

```
private List<Role> defaultRoles;

private Map<String, Role> roles;

@Getter
@Setter
public static class Role {

    private String id;

    private String name;

}
```



## Kode : Application Properties

```
application.default-roles[0].id=default
application.default-roles[0].name=Default Role
application.default-roles[1].id=guest
application.default-roles[1].name=Guest Role

application.roles.admin.id=admin
application.roles.admin.name=Admin Role
application.roles.finance.id=finance
application.roles.finance.name=Finance Role
```

# Kode : Unit Test Embedded Collection Properties

```
@Test
void testEmbeddedCollection() {
    Assertions.assertEquals( expected: "default", applicationProperties.getDefaultRoles().get(0).getId());
    Assertions.assertEquals( expected: "Default Role", applicationProperties.getDefaultRoles().get(0).getName());
    Assertions.assertEquals( expected: "guest", applicationProperties.getDefaultRoles().get(1).getId());
    Assertions.assertEquals( expected: "Guest Role", applicationProperties.getDefaultRoles().get(1).getName());

    Assertions.assertEquals( expected: "admin", applicationProperties.getRoles().get("admin").getId());
    Assertions.assertEquals( expected: "Admin Role", applicationProperties.getRoles().get("admin").getName());
    Assertions.assertEquals( expected: "finance", applicationProperties.getRoles().get("finance").getId());
    Assertions.assertEquals( expected: "Finance Role", applicationProperties.getRoles().get("finance").getName());
}
```

---

# Conversion

---

# Conversion

- Saat kita menggunakan config properties di Spring, ada pertanyaan, bagaimana Spring melakukan konversi data yang ada di properties file ke tipe data di Java?
- Jawabannya adalah karena Spring memiliki mekanisme konversi tipe data.
- Secara default, hampir semua tipe data umum di Java didukung, namun bagaimana jika tipe data yang kita buat sendiri?
- Jika ada kasus seperti itu, kita bisa membuat class Conversion sendiri



# Converter Interface

- Semua konversi tipe data di Spring sudah dibuat standarisasinya, yaitu menggunakan interface Converter
- <https://docs.spring.io/spring-framework/docs/current/javadoc-api/org/springframework/core/converter/Converter.html>

---

## Default Converter

- Secara default, Spring juga sudah menyediakan Converter untuk tipe data bawaan Java, seperti Number, Boolean, Date, Calendar, Duration, dan lain-lain
- Kita bisa lihat secara semua class turunan dari Converter

# Default Converter di Spring

Find: Implementations of Converter ×

The screenshot shows a code search interface with a dark theme. On the left is a vertical toolbar with various icons: up, down, search, filter, and others. The main area has a header 'Find: Implementations of Converter ×'. Below it, a tree view shows the search results: 'Implementations of Converter in 66 results'. Under this, there's a category 'Unclassified 66 results' containing 14 items, each with a file icon and a link to a Java file: CharacterToNumberFactory.java, ConvertingComparator.java, DateFormatteRegistrar.java, DateTimeConverters.java, DeserializingConverter.java, EnumToIntegerConverter.java, EnumToStringConverter.java, InputStreamSourceToByteArrayConverter.java, IntegerToEnumConverterFactory.java, JodaTimeConverters.java, LenientObjectToEnumConverterFactory.java, NumberToCharacterConverter.java, and NumberToNumberConverterFactory.java. Each item shows '1 result'.

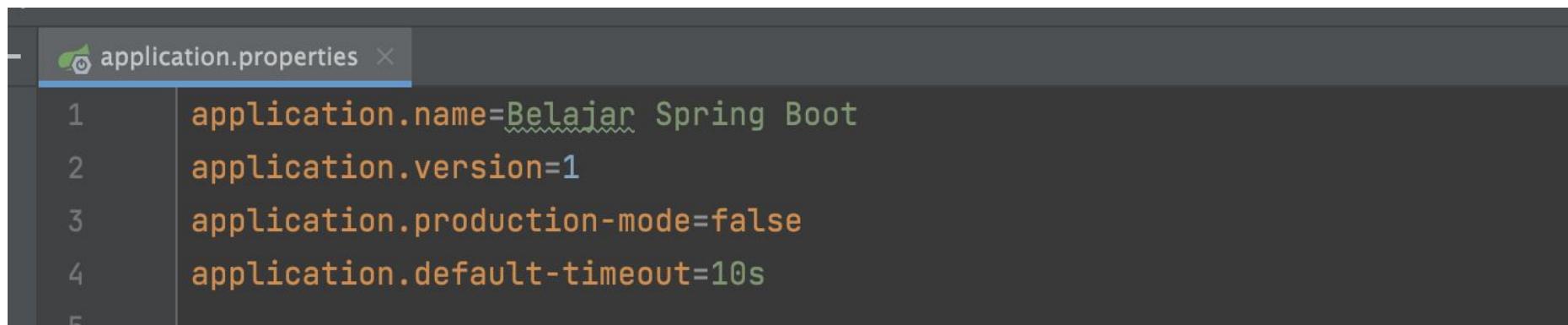
- Implementations of Converter in 66 results
  - Unclassified 66 results
    - > [CharacterToNumberFactory.java](#) 1 result
    - > [ConvertingComparator.java](#) 1 result
    - > [DateFormatteRegistrar.java](#) 6 results
    - > [DateTimeConverters.java](#) 20 results
    - > [DeserializingConverter.java](#) 1 result
    - > [EnumToIntegerConverter.java](#) 1 result
    - > [EnumToStringConverter.java](#) 1 result
    - > [InputStreamSourceToByteArrayConverter.java](#) 1 result
    - > [IntegerToEnumConverterFactory.java](#) 1 result
    - > [JodaTimeConverters.java](#) 14 results
    - > [LenientObjectToEnumConverterFactory.java](#) 1 result
    - > [NumberToCharacterConverter.java](#) 1 result
    - > [NumberToNumberConverterFactory.java](#) 1 result



## Kode : Duration Converter

```
@Getter  
@Setter  
@ConfigurationProperties("application")  
public class ApplicationProperties {  
  
    private Duration defaultTimeout;
```

## Kode : Application Properties



The screenshot shows a code editor window with a dark theme. The title bar says "application.properties". The file contains the following configuration properties:

```
1 application.name=Belajar Spring Boot
2 application.version=1
3 application.production-mode=false
4 application.default-timeout=10s
```



## Kode : Unit Test Duration

```
@Test
void testDurationProperties() {
    Assertions.assertEquals(Duration.ofSeconds(10), applicationProperties.getDefaultTimeout());
}
```

---

## Custom Converter

- Jika ada kasus yang akhirnya mengharuskan kita membuat converter sendiri, kita bisa dengan mudah membuat class turunan interface Converter
- Misal kita coba buat Converter untuk tipe data String ke Date

---

## Kode : String to Date Converter

```
@Component
public class StringToDateConverter implements Converter<String, Date> {

    private final SimpleDateFormat DATE_FORMAT = new SimpleDateFormat("yyyy-MM-dd");

    @Override
    @SneakyThrows
    public Date convert(String source) {
        return DATE_FORMAT.parse(source);
    }
}
```



## Kode : Application Properties

```
@Getter  
@Setter  
@ConfigurationProperties("application")  
public class ApplicationProperties {  
  
    private Date expireDate;  
  
    private Duration defaultTimeout;
```



## Kode : Unit Test Custom Converter

```
@Test
void testDurationProperties() {
    Assertions.assertEquals(Duration.ofSeconds(10), applicationProperties.getDefaultTimeout());
}
```

---

## Kenapa Error?

- Secara default, jika kita ingin menggunakan custom Converter, kita harus registrasikan ke ConversionService
- ConversionService akan kita bahas di materi selanjutnya

---

# Conversion Service

---

# Conversion Service

- Conversion Service merupakan inti dari logic untuk melakukan konversi tipe data di Spring
- <https://docs.spring.io/spring-framework/docs/current/javadoc-api/org/springframework/core/converter/ConversionService.html>
- Saat kita membuat custom converter, maka kita harus registrasikan ke conversion service
- Kita tidak perlu membuat Conversion Service secara manual, karena implementasi class nya sudah disediakan oleh Spring, yaitu ApplicationConversionService
- Jika membuat aplikasi berbasis Web, kita tidak perlu melakukannya secara manual, karena sudah otomatis ada di Spring Boot Web, namun karena sekarang kita belum belajar Spring Boot Web, jadi kita perlu membuat Conversion Service secara manual



# Kode : Membuat Conversion Service

```
@SpringBootApplication
@EnableConfigurationProperties({
    ApplicationProperties.class
})
@Import(StringToDateConverter.class)
public static class TestApplication {

    @Bean
    public ConversionService conversionService(StringToDateConverter stringToDateConverter){
        ApplicationConversionService conversionService = new ApplicationConversionService();
        conversionService.addConverter(stringToDateConverter);
        return conversionService;
    }
}
```

---

## Menggunakan Conversion Service

- Conversion Service selain bisa digunakan untuk melakukan konversi tipe data secara otomatis ketika kita menggunakan config properties, tapi juga bisa digunakan secara programmatically untuk melakukan konversi tipe data
- Caranya cukup kita ambil object ConversionService



## Kode : Menggunakan Conversion Service

```
@Autowired
private ConversionService conversionService;

@Test
void testConversionService() {
    Assertions.assertTrue(conversionService.canConvert(String.class, Duration.class));
    Assertions.assertEquals(Duration.ofSeconds(10), conversionService.convert( source: "10s", Duration.class));
}
```

---

# Externalized Properties File

---

# Externalized Properties File

- Saat aplikasi Spring Boot kita sudah selesai, semua config properties akan dibungkus di dalam jar file
- Pertanyaannya bagaimana jika kita ingin mengubah isi informasi nya?
- Misal konfigurasi database tidak mungkin kita simpan di dalam kode program
- Ada beberapa cara untuk menggunakan configuration dari luar aplikasi, ketika aplikasi kita sudah menjadi jar file

---

## External Properties File

- Pertama kita bisa membuat application.properties file dari luar, lalu ketika menjalankan aplikasi Jar Spring Boot kita, kita bisa menyebutkan lokasi application.properties nya
- Caranya kita bisa gunakan perintah :  
`java -jar lokasi/file.jar --spring.config.location=lokasi/file/application.properties`

---

## Kode : Contoh Program Sederhana

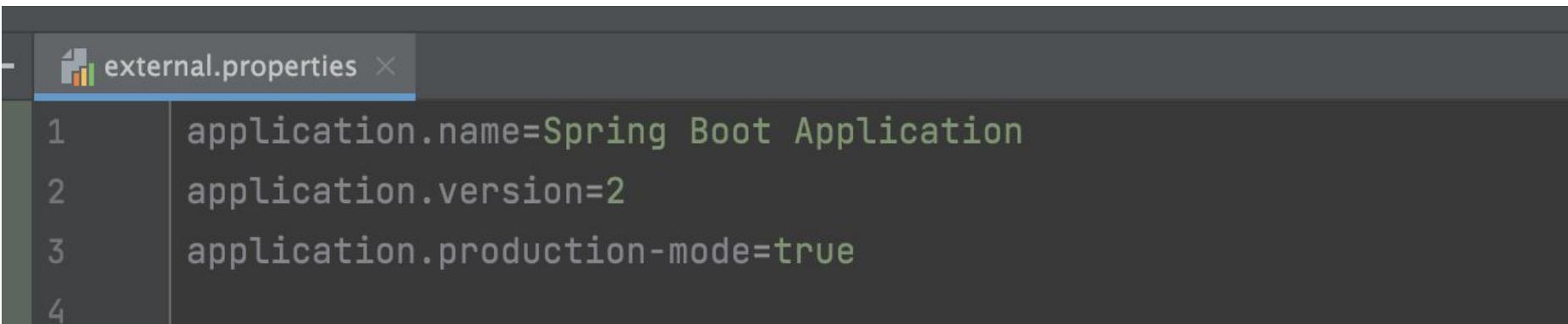
```
@Slf4j
@Component
@AllArgsConstructor
public class ApplicationPropertiesRunner implements ApplicationRunner {

    private ApplicationProperties applicationProperties;

    @Override
    public void run(ApplicationArguments args) throws Exception {
        log.info(applicationProperties.getName());
        log.info(String.valueOf(applicationProperties.getVersion()));
        log.info(String.valueOf(applicationProperties.isProductionMode()));
    }
}
```

---

## Kode : Contoh External Application Properties



The screenshot shows a code editor window with a dark theme. At the top, there is a tab labeled "external.properties" with a small icon to its left. The main area of the editor displays four lines of configuration data:

```
1 application.name=Spring Boot Application
2 application.version=2
3 application.production-mode=true
4
```

# Menjalankan Aplikasi

```
→ belajar-spring-config-properties java -jar target/belajar-spring-config-properties-0.0.1-SNAPSHOT.jar --spring.config.location=external.properties

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=====|_|=====|_|=/_/_/_/
:: Spring Boot ::          (v2.6.0)

2021-12-01 16:25:23.437  INFO 50418 --- [           main] BelajarSpringConfigPropertiesApplication : Starting BelajarSpringConfigPropertiesApplication v0.0.1-SNAPSHOT
evelopments/BELAJAR/belajar-spring-config-properties/target/belajar-spring-config-properties-0.0.1-SNAPSHOT.jar started by khannedy in /Users/khannedy/Developments/B
2021-12-01 16:25:23.438  INFO 50418 --- [           main] BelajarSpringConfigPropertiesApplication : No active profile set, falling back to default profiles: default
2021-12-01 16:25:23.895  INFO 50418 --- [           main] BelajarSpringConfigPropertiesApplication : Started BelajarSpringConfigPropertiesApplication in 0.847 seconds
2021-12-01 16:25:23.897  INFO 50418 --- [           main] c.p.s.c.r.ApplicationPropertiesRunner : Spring Boot Application
2021-12-01 16:25:23.897  INFO 50418 --- [           main] c.p.s.c.r.ApplicationPropertiesRunner : 2
2021-12-01 16:25:23.897  INFO 50418 --- [           main] c.p.s.c.r.ApplicationPropertiesRunner : true
→ belajar-spring-config-properties
```

---

# Environment Variable

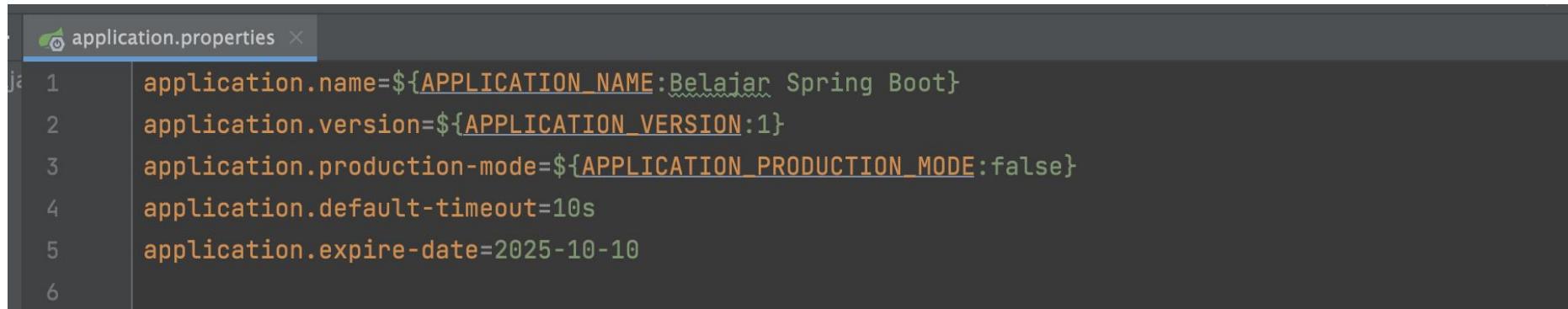
---

# Environment Variable

- Saat kita menggunakan external properties file, properties file yang ada di dalam Jar tidak akan digunakan
- Hal ini menyebabkan kita harus menulis ulang semua properties key yang ada di properties file, dan kadang jika isinya terlalu banyak, ini sangat menyulitkan
- Spring Boot juga mendukung mengambil properties dari environment variable
- Hal ini membuat kita lebih mudah, karena tidak harus semua properties dibuat ulang di file external properties, cukup yang dibutuhkan saja
- Selain itu, kita juga bisa membuat default value ketika environment variable nya tidak ada

---

## Kode : Properties File



The screenshot shows a code editor window with a dark theme. The title bar of the window says "application.properties". The file contains the following configuration properties:

```
ja 1 application.name=${APPLICATION_NAME:Belajar Spring Boot}
  2 application.version=${APPLICATION_VERSION:1}
  3 application.production-mode=${APPLICATION_PRODUCTION_MODE:false}
  4 application.default-timeout=10s
  5 application.expire-date=2025-10-10
  6
```

# Kode : Menjalankan Dengan Environment Variable

```
→ belajar-spring-config-properties export APPLICATION_NAME="Spring Boot Application"
→ belajar-spring-config-properties export APPLICATION_PRODUCTION_MODE="true"
→ belajar-spring-config-properties java -jar target/belajar-spring-config-properties-0.0.1-SNAPSHOT.jar

.
-----
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\ \ \_ ) | | ) | | | | | ( | | ) ) ) )
' | ____| .__|_|_|_|_|_\__, | / / /
=====|_|=====|_|=/|_|/_/
:: Spring Boot ::          (v2.6.0)

2021-12-01 16:32:24.883  INFO 50575 --- [           main] BelajarSpringConfigPropertiesApplication : Starting BelajarSpringConfigPropertiesApplication
2021-12-01 16:32:24.883  INFO 50575 --- [           main] BelajarSpringConfigPropertiesApplication : Environment: properties=belajar-spring-config-properties/target/belajar-spring-config-properties-0.0.1-SNAPSHOT.jar
2021-12-01 16:32:24.886  INFO 50575 --- [           main] BelajarSpringConfigPropertiesApplication : Started BelajarSpringConfigPropertiesApplication in 0.017 seconds (local)
2021-12-01 16:32:25.314  INFO 50575 --- [           main] BelajarSpringConfigPropertiesApplication : The following profiles are active: local
2021-12-01 16:32:25.314  INFO 50575 --- [           main] BelajarSpringConfigPropertiesApplication : Started BelajarSpringConfigPropertiesApplication in 0.017 seconds (local)
2021-12-01 16:32:25.316  INFO 50575 --- [           main] c.p.s.c.r.ApplicationPropertiesRunner : Spring Boot Application
2021-12-01 16:32:25.316  INFO 50575 --- [           main] c.p.s.c.r.ApplicationPropertiesRunner : 1
2021-12-01 16:32:25.316  INFO 50575 --- [           main] c.p.s.c.r.ApplicationPropertiesRunner : true
→ belajar-spring-config-properties
```

---

# Mengubah Profile

---

## Mengubah Profile

- Selain mengubah active profile menggunakan application properties, kita juga bisa menggunakan command line argument untuk mengubah active profile
- Kita bisa gunakan argument :  
--spring.profiles.active=first,second



# Kode : Mengubah Active Profile

```
→ belajar-spring-config-properties java -jar target/belajar-spring-config-properties-0.0.1-SNAPSHOT.jar --spring.profiles.active=production,test

.
-----
Δ / --- - _ _ - ( )_ -- _ _ - \ \ \
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\ \ \ _ _ ) | _ ) | | | | | | ( _ | + ) ) )
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=====|_|=====|_|/_=/|-/_/_/
:: Spring Boot ::                      (v2.6.0)

2021-12-01 17:05:08.427  INFO 51213 --- [           main] BelajarSpringConfigPropertiesApplication : Starting BelajarSpringConfigPropertiesApplication v0.0.1-
developments/BELAJAR/belajar-spring-config-properties/target/belajar-spring-config-properties-0.0.1-SNAPSHOT.jar started by khannedy in /Users/khannedy/Developme
2021-12-01 17:05:08.429  INFO 51213 --- [           main] BelajarSpringConfigPropertiesApplication : The following profiles are active: production,test
2021-12-01 17:05:08.894  INFO 51213 --- [           main] BelajarSpringConfigPropertiesApplication : Started BelajarSpringConfigPropertiesApplication in 0.875
2021-12-01 17:05:08.896  INFO 51213 --- [           main] c.p.s.c.r.ApplicationPropertiesRunner : Belajar Spring Boot
2021-12-01 17:05:08.896  INFO 51213 --- [           main] c.p.s.c.r.ApplicationPropertiesRunner : 1
2021-12-01 17:05:08.896  INFO 51213 --- [           main] c.p.s.c.r.ApplicationPropertiesRunner : false
```

---

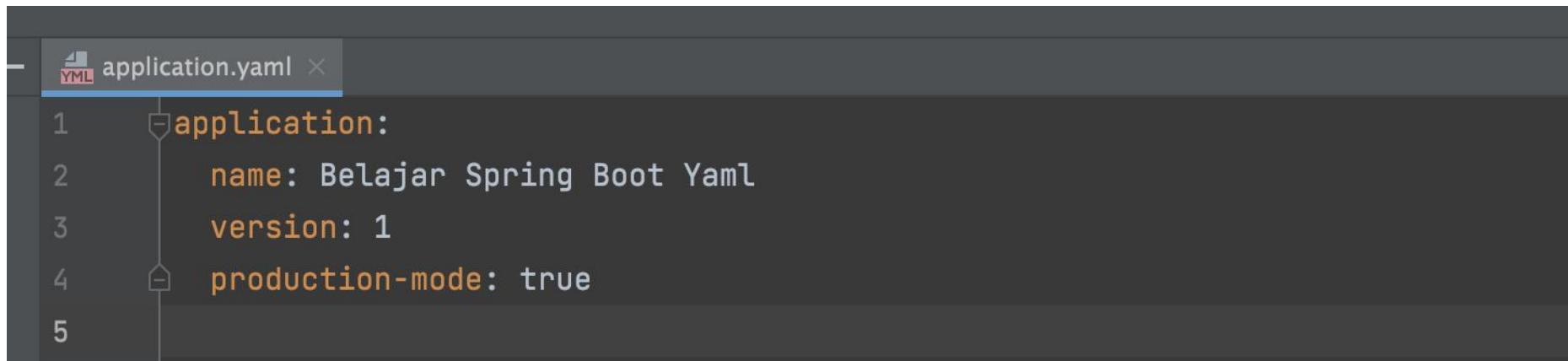
# Yaml

---

# Yaml

- Selain menggunakan file properties, Spring Boot juga mendukung penggunaan file Yaml
- Caranya sangat mudah, kita bisa mengganti semua file properties yang kita gunakan menjadi file Yaml
- File Yaml sangat mempermudah ketika kita membuat configuration yang sangat kompleks

## Kode : Contoh File Yaml



The screenshot shows a code editor window with a dark theme. The title bar of the window is labeled "application.yaml". The file content is displayed in a monospaced font. The code is as follows:

```
1 application:  
2   name: Belajar Spring Boot Yaml  
3   version: 1  
4   production-mode: true  
5
```

The first line "application:" has a small tree icon to its left, indicating it's a root-level key. Lines 1 through 4 are indented under this key. Line 5 is at the same level as line 1.

---

# Kode : Menjalankan Dengan Yaml

```
→ belajar-spring-config-properties java -jar target/belajar-spring-config-properties-0.0.1-SNAPSHOT.jar --spring.config.location=application.yaml

.
-----
\ \ / _ _ _ _ ( ) _ _ _ _ _ \ \ \
( ( ) \_ _ _ _ ' _ | ' _ | ' _ \ \ _ ' | \ \ \
\ \ \_ ( ) | ( ) | | | | | ( ) | ) ) )
' | _ _ | . _ _ | _ _ | _ \ _ , | / / /
=====|_|=====|_|=/_|/_/_/
:: Spring Boot ::          (v2.6.0)

2021-12-01 17:08:07.153  INFO 51262 --- [           main] BelajarSpringConfigPropertiesApplication : Starting BelajarSpringConfigPropertiesApplication
evelopments/BELAJAR/belajar-spring-config-properties/target/belajar-spring-config-properties-0.0.1-SNAPSHOT.jar started by khannedy in /Users/khannedy/D
2021-12-01 17:08:07.155  INFO 51262 --- [           main] BelajarSpringConfigPropertiesApplication : No active profile set, falling back to default pr
2021-12-01 17:08:07.604  INFO 51262 --- [           main] BelajarSpringConfigPropertiesApplication : Started BelajarSpringConfigPropertiesApplication
2021-12-01 17:08:07.606  INFO 51262 --- [           main] c.p.s.c.r.ApplicationPropertiesRunner : Belajar Spring Boot Yaml
2021-12-01 17:08:07.606  INFO 51262 --- [           main] c.p.s.c.r.ApplicationPropertiesRunner : 1
2021-12-01 17:08:07.606  INFO 51262 --- [           main] c.p.s.c.r.ApplicationPropertiesRunner : true
```

---

# Materi Selanjutnya

---

## Materi Selanjutnya

- Spring Logging
- Spring Validation
- Spring Aspect Oriented Programming
- Spring Async
- Spring Data JPA
- Spring Web MVC
- Dan lain-lain